Remarks

In view of the above amendments and the following remarks, favorable reconsideration of the outstanding office action is respectfully requested.

Attached hereto is a page entitled "Version of Markings to Show Changes Made."

Claims 1-37 remain in this application. Claims 2, 19 and 20 have been amended.

1. Drawings

The Examiner has indicated that the drawings previously submitted have been objected to as "not descriptive". Applicants are not sure in what way the drawings are not descriptive. Upon further explanation and suggestions by the Examiner, applicants will resubmit the drawings, including proposed revisions marked in red for the Examiner's review and approval.

2. Claim objections

Claim 2 stands objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Accordingly, claim 2 has been amended to specify how various sub-units have been connected to one another.

3. § 112 Rejections

Claims 19-21 and 32 stand rejected under 35 USC § 112, second paragraph, as being indefinite.

Claims 19 and 20 have been amended to make them even more definite.

Claim 19 specifies that "<u>each of said</u> optical signal amplifying, input, and output <u>component groups</u> includes a <u>maximum number of said optical components common</u> <u>to each of said</u> first, second, third, and fourth optical <u>amplifiers</u>". That is, if components "a", "b" and "c" are present, in addition to other components in each functional group, (for example, in the input component groups) in each of the four amplifiers, then this component group should include all of these components. More specifically the component groups should include components "a", "b", and "c" and <u>not</u> only components "a" and "b", or "b" and "c". In other words, a <u>maximum number of common</u> "input" components utilized in different amplifiers should be present in the input component group. Similarly, a maximum number of common

"amplifying" components, utilized in different amplifiers, should be present in the amplifying component group.

With regard to the sub-set group, claim 19 specifies that each of the subset component groups has "the minimum number of said optical components common to each of said respective component groups". Thus, according to claim 19, each of the said groups includes the minimum number of common components. This selection process is described, for example, on pages 6 (lns. 21-32) to page 7 (lns 1-13) of the applicants specification. Accordingly, applicants respectfully submit that the above claim language is reasonably clear and is not indefinite.

The office action, with respect to claim 20 states: "the claim fails to disclose what each component is mounted on. The Examiner will assume that this is intended to be the support board."

Claim 20 specifies that the components forming a specific component group (or a sub-component group) are mounted on one or more of the corresponding sub-units. Claim 20 states, for example, that the optical signal amplifying components are mounted "on one or more amplifying sub-units" and that the mounting optical signal amplifying components subset group are also mounted "on one or more amplyfying sub-units". Similar language is used to discuss mounting of the input components group, output components groups and their coresponding subgroups.

Such sub-unit is preferably, a substrate, or support board, as described on page 7, lines 13-15 of the specification. Other sub-units may also be utilized. Therefore, claim 20 should be interpreted broadly and should not be limited to just the support board.

Claim 21 specifies that various component groups and components subgroups are arranged on their respective sub units, such that "optical fiber splices between any of said two optical components provides a low loss and a high strength splice".

The Examiner stated that claim 21 is indefinite because the claim does not disclose how to arrange the components so as to cause the splice to be a low loss and a high strength splice. However, the claim does not need to specify, in detail, the location are each optical component. Several of such component arrangements or disclosed in specification and illustrated in the drawings. That is, applicants' specification (for example page 13, ln. 7-page 17, ln 11) describes how to avoid high optical loss and how to arrange the optical components to do so.

With respect to claim 32, the office action stated that this claim is indefinite because "the term effect could either mean that there are additional components included in the amplifier that modify the described characteristics or the different components are used to provide similar function".

Applicants respectfully disagrees that the language of claim 32 is indefinite for the following reasons:

Claim 32 specifies: "substituting for said second pluggable sub-unit a sixth pluggable sub-unit which includes a <u>fourth group</u> of optical components that effect each of a first signal amplifying stage, a second signal amplifying stage, and the gain flatness of said optical fiber amplifier, said fourth group of optical components providing said optical amplifier with a <u>second net</u> gain". This language is not indefinite because one can easily evaluate the fourth group of optical components to see if there are different optical components of the second sub-unit. Furthermore, one can easily evaluate its set of optical components to see if they provide different net gain (i.e. "second net gain"), as specified by claim 32.

Furthermore, according to the MPEP 2173.02:

"The examiner's focus during examination for claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph is <u>whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available</u>. When the examiner is satisfied that patentable subject matter is disclosed, and it is apparent to the examiner that the claims are directed to such patentable subject matter, he or she should allow claims which define the patentable subject matter with a <u>reasonable</u> degree of particularity and distinctness. <u>Some latitude n the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire</u>".

Accordingly, Applicants respectfully submit that claims 19-21 and 32 define the scope of the invention with a reasonable degree of certainty.

MPEP section 2173.01 further states:

"Applicant may use functional language, alternative expressions, negative limitations, <u>or any style of expression or format of claim which makes clear the boundaries of the subject</u> matter for which protection is sought. As noted by the Court in *In re Swinehart*, 439 F.2d 210, 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought".

Finally, according to MPEP 2173.04:

"Breadth of a claim is not to be equated with indefiniteness. In *re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph". Therefore, applicants submit that claims 19-21 and 32 are not indefinite under 35 USC § 112, second paragraph.

3. § 103 Rejections

Claims 1-6, 8, 10-14, and 31-36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable for obviousness over U.S. Patent No. Flood et al. in view of Csipkes et al. and Iwano et al.

Claims 7-9 stand rejected under 35 U.S.C 103(a) as being unpatentable over Flood et al. in view of Csipkes et al and Iwano et al and in further view of Becker et al.

Claims 15-30 and 37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable for obviousness over U.S. Patent No. Flood et al. in view of Csipkes et al. and Iwano et al. as applied to claim 4 above, and further in view of Becker et al.

I. The present application and the Flood ('047) reference are both owned by the same assignee (Corning Inc.) and share at least one common inventor. In addition, included herewith, is a § 1.131 Declaration showing that the date of the invention for the claimed subject matter is prior to the effective US filing date of the Flood reference. Accordingly, claims 1-6, 8, 10-14, 15-30, 31-36 and 37 are not obvious over the cited references.

It was brought to the Applicant attention that the Flood reference has a related Canadian application also owned by the same assignee. This application was issued as Canadian Patent No. 2,233,526 on October 16, 2001 and was published on August 8, 1999. A copy of this issued patent is enclosed herewith.

II. With regard to claims 1-6, 8, 10-14 and 31-36 the Iwano reference discloses very specific connectors- i.e., "connectors developed for multiple optical connections between a printed board and a back panel" (see abstract). This reference does not specify, teach or imply that the disclosed connectors could be used to connect amplifier modules to one

another. Absent such suggestion in the reference itself, applicants submit that claims 1-6, 8, 10-14 and 31-36 are not obvious over the cited references.

Moreover, although the Csipkes reference teaches a "modular optical amplifier" it does not suggest that it would apply "Flood like amplifiers". It was Applicants who realized that a "Flood-like" amplifier may be configured in a easily configurable manner by having pump subunits, telemetry drop (input) subunits, telemetry add (output) subunits and pump subunits. The Csipkes reference does not teach a separate amplification and input and output subunits. In fact, the Csipkes reference teaches that the input components should be within the first amplification stage cassette (cassette 1) and that the output components should be in the second amplification stage (cassette 3) (See Figure 1 of this reference). That is, applicants claim specify different partitioning of the components that what is disclosed by the Csipkes reference. Accordingly, because the claimed references, in combination, do not disclose all of the claimed features, Applicant's claims 1-6, 8, 10-14 and 31-36 are not obvious over Flood et al. In view of Csipkes et al and Iwano et al.

With regard to claim 4, the Office Action (pg. 6) states that "It would have been obvious to modify a second pump module to allow for flexible pump configurations". However, none of the references teaches or suggests that the second pump should have a "flexible pump configuration". This is Applicants' teaching. Absent such teaching in the prior art, Applicants submit that claim 4 is not obvious over the cited reference. Similarly, with regard to claim 5, it was the Applicants who discovered that the specific placement of certain components reduces Noise Figure NF and increase output power while flattening gain spectrum and that these components should be grouped within specific modules. These groupings are not disclosed by the Csipkes reference. In fact, the Csipkes reference does not even disclose a GFF. The Office Action stated "it would have been obvious to modify the apparatus to form an amplifying module with components in said order to provide an easily exchangeable gain stage". However, such placement of these components to provide a flexible or exchangable gain stage is not disclosed by the cited references. Accordingly, claim 5 is not obvious over the cited references.

With regard to claim 11, the Office Action states that "Flood et al teaches each of the claimed components but fails to teach the precise location of the VOA as claimed. It would have been obvious to modify the apparatus by shifting the OA to the location between the supervisory channel drop and the tap coupler so as to allow a supervisory channel to be demultiplexed with greater power." However, this feature is not shown in the cited reference.

Absent such teaching from the references themselves, claim 11 is not obvious over these references.

With respect to claim 13, the Csipkes reference teaches that the output components should be included in the amplification or the other references that the output stage be made modular to allow flexibility in monitoring propagation signals. This applicants' teachings. The use of applicants own teaching or hindsight is not permissible when ascertaining whether or not the invention is obvious over the prior art. Accordingly, claim 13 is not obvious over the cited references.

With respect to claim 14 the Iwano reference teaches connection between a PCB and a back panel, not between modules; it does not teach a modular approach in amplifier design and does not teach or suggest that its couplers could be utilized in connecting modules to one another.

Accordingly, claim 14 is not obvious over the sited references.

Claim 15 specifies a method of making an optical amplifier including the step of "optically connecting each of said desired pump, optical signal amplifying, input and output subunits on a support board via a plurality of pluggable fiber optic connectors". This step is not disclosed in any of the cited references. More specifically, applicants discovered that typical optical connectors do not have enough strength to rigidly connect and keep connected two subunits to one another. That is, connection of the two subunits directly to one another (without fused pigtails) was often unreliable and unstable. The typical connectors simply were not strong enough to provide connectors simply were not strong enough to provide enough rigidity and to keep the subunits in their precise location. Therefore the subunits were on a support board to provide the rigidity and a stable connection function. This is illustrated below:

The Csipkes reference teaches to mount the units to one another. It does not teach mounting them to the support board. The other cited references do not teach to mount amplifiers.

In addition, claim 15 specifies the step of providing "different optical signal amplifying subunits, different input subunits and different output subunits". The Csipkes reference does not disclose different signal amplifying subunits and different input subunits or different output subunits. In fact, the Csipkes reference teaches that (i) the input components should be in the 1st amplification cassette and that the output components should be in the 2nd amplification cassette. In addition, none of the other cited references discloses this claimed feature. Accordingly, because the cited references, in combination, do not disclose the features of claim 15. Claim 15 in not obvious over Flood in view of Csipkes, Iwano and the Webster's dictionary. Claims 16-30 depend from claim 15 as their base claim and, therefore, incorporate the language of claim 15. Therefore, claims 16-30 are also not obvious over the cited reference.

With respect to claim 37, Flood et al does not teach a modular approach to making an amplifier. Neither Flood nor Csipkes, nor other cited references teach how to make "n different types of amplifiers", nor do they even mention "at least four functional groups of subunits" with "one functional group containing at least n different types of subunits; nor does it teach the step of "selecting a specific subunit from each of said functional groups and plugging together each of said selected subunits to form an optical amplifier of the desired specification. Accordingly, claim 37 is not obvious Flood et al in view of Csipkes et al., Iwano et al., and the Webster's dictionary.

4. Conclusion

Based upon the above amendments, remarks, and papers of record, Applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests reconsideration of the pending claims 1-37 and a prompt Notice of Allowance thereon.

Applicant believes that one month extension of time is necessary at a fee of $110.00 pursuant to 37 C.F.R. § 1.136(a) to be charged to Corning Incorporated Deposit Account 03-3325. If any other fees are necessary to make this Reply timely, and hereby authorizes the

Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Svetlana Z. Short at (607) 974-0412.

Respectfully submitted,

CORNING INCORPORATED

Date: 7/9/02

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Svetlana Z. Short

Name of applicant, assignee, or Registered Representative

Svetlana Short

Signature

7/9/02

Date of Signature

VERSION OF MARKINGS TO SHOW CHANGES MADE

What is claimed is:

1. An optical fiber amplifier assembly, comprising:

a support board;

a first pluggable sub-unit mounted onto said support board, said first pluggable sub-unit comprising a first pump source having a pump wavelength of λ_1;

a second pluggable sub-unit mounted onto said support board, said second pluggable sub-unit comprising a plurality of first stage optical signal amplifying components;

a third pluggable sub-unit mounted onto said support board, said third pluggable sub-unit comprising a plurality of input stage components; and

a fourth pluggable sub-unit mounted onto said support board, said fourth pluggable sub-unit comprising a plurality of output stage components;

said second pluggable sub-unit being optically connected to each of said first, third and fourth pluggable sub-units.

2. **(Amended)** The optical amplifier assembly of claim 1, <u>further comprising a first, third and fourth fiber-optic connector,</u> wherein said second pluggable sub-unit is optically connected to each of said first, third and fourth pluggable sub-units via <u>said</u> [a] first, third and fourth [board mountable] fiber-optic connector, respectively.

3. The optical amplifier assembly of claim 1, wherein said second pluggable sub-unit comprises a plurality of second stage optical signal amplifying components.

4. The optical amplifier assembly of claim 3, further comprising a fifth pluggable sub-unit mounted onto said support board, said fifth pluggable sub-unit having a second pump source that has a pump wavelength of λ_2 and which is optically connected to said second pluggable sub-unit via a fifth board mountable fiber-optic connector.

5. The optical amplifier assembly of claim 4, wherein said plurality of first and second stage optical signal amplifying components comprises in a direction of an optical signal

transmission a first wavelength-division multiplexing coupler serially connected to a first rare-earth doped optical fiber coil, said first rare-earth doped optical fiber coil being serially connected to a first optical isolator, said first optical isolator being serially connected to a gain flattening filter, said gain flattening filter being serially connected to a second wavelength-division multiplexing coupler, said second wavelength-division multiplexing coupler being serially connected to a second rare-earth doped optical fiber coil.

6. The optical amplifier assembly of claim 4, wherein said pump wavelength λ_1 of said first pump source is approximately equal to said pump wavelength λ_2 of said second pump source.

7. The optical amplifier assembly of claim 4, wherein said pump wavelength λ_1 of said first pump source is different than that of said pump wavelength λ_2 of said second pump source.

8. The optical amplifier assembly of claim 6, wherein each of said pump wavelength λ_1 and λ_2 is approximately 980 nanometers.

9. The optical amplifier assembly of claim 7, wherein said pump wavelength λ_1 of said first pump source is 980 nanometers and wherein said pump wavelength λ_2 of said second pump source is 1480 nanometers.

10. The optical amplifier assembly of claim 9, wherein said plurality of input stage components comprises in said direction of said optical signal transmission a first tap coupler, and a first photodetector serially connected to said tap coupler.

11. The optical amplifier assembly of claim 10, wherein said plurality of input stage components further comprises in said direction of said optical signal transmission a second optical isolator serially connected to a supervisory channel drop unit, a receiver serially connected to said supervisory channel drop unit, a variable optical attenuator serially connected to said supervisory channel drop unit at a first end and to said first tap coupler at an opposite end.

12. The optical amplifier assembly of claim 11, wherein said plurality of output stage components comprises in said direction of said optical signal transmission:

a second tap coupler, and a second photodetector serially connected to said second tap coupler.

13. The optical amplifier assembly of claim 12, wherein said plurality of output stage components further comprises in said direction of said optical signal transmission: a third optical isolator serially connected to said second tap coupler, a supervisory channel add unit serially connected to said third optical isolator and a transmitter serially connected to said supervisory channel add unit.

14. The optical amplifier assembly of claim 13, wherein each of said first, third, fourth and fifth board mountable fiber-optic connectors comprises a respective first-half member and a respective mating second-half member, each of said respective first-half members being mounted along an edge of each of said first, third, fourth and fifth pluggable sub-unit, respectively, and each of said respective mating second-half members being mounted along the edges of said second pluggable sub-unit.

15. A method of making an optical fiber amplifier comprising the steps of:

providing a plurality of different pump sub-units, different optical signal amplifying sub-units, different input sub-units and different output sub-units;

selecting one desired sub-unit from each of said plurality of different pump sub-units, different optical signal amplifying sub-units, different input sub-units and different output sub-units;

optically connecting each of said desired pump, optical signal amplifying, input and output sub-units on a support board via a plurality of pluggable fiber optic connectors to make said optical fiber amplifier.

16. The method of claim 15, wherein said providing step includes the step of first providing a design for each of a first, second, third and fourth optical fiber amplifier, each of said first, second, third and fourth optical fiber amplifier comprising a plurality of optical components.

17. The method of claim 16, wherein said first providing step further includes: for each of said first, second, third and fourth optical fiber amplifier, dividing said plurality of optical components into at least four functional groups, including a pump components group, an optical signal amplifying components group, an input components group and an output components group, each of said functional groups comprising one or more optical components.

18. The method of claim 17, wherein said pump components group is further divided into a first pump components group and a second pump components group, said first pump components group including a first pump laser having an output wavelength of λ_1, said second pump components group including a second pump laser having an output wavelength of λ_2.

19. **(Amended)** The method of claim 17, further comprising the steps of:

forming an optical signal amplifying components group, an input components group and an output components group, wherein each of said optical signal amplifying, input and output components groups includes a maximum number of said optical components common to each of said first, second, third and fourth optical fiber amplifiers; and

forming an optical signal amplifying [subset] components <u>subset</u> group, an input [subset] components <u>subset</u> group and an output [subset] components <u>subset</u> group, each of said [subset] components <u>subset</u> groups having the minimum number of said optical components common to each of said respective components groups for each of said first, second, third and fourth optical fiber amplifiers.

20. **(Amended)** The method of claim [18] <u>19</u>, further comprising the steps of:

mounting each of said optical signal amplifying components group [formed] on one or more amplifying sub-units, mounting each of said input components group [formed] on one or more input sub-units, and mounting each of said output components group [formed] on one or more output sub-units;

mounting each of said optical signal amplifying components subset group [formed] on one or more amplifying sub-units, mounting each of said input components subset group [formed] on one or more input sub-units, and mounting each of said output components subset group [formed] on one or more output sub-units;

and

mounting each of said first pump components group and said second pump components group on a first pump sub-unit and a second pump sub-unit, respectively.

21. The method of claim 20, further comprising the step of:

arranging each of said optical signal amplifying, input and output components groups and each of said optical signal amplifying, input and output subset components groups on said respective sub-units such that an optical fiber splice between any two of said optical components provides a low-loss and a high strength splice.

22. The method of claim 21, wherein said step of optically connecting comprises:

mounting on an edge of each of said pump sub-units, each of said input sub-units, and each of said output sub-units a first-half member of a board mountable fiber-optic connector that is adapted for mating with a respective second-half member mounted on each of said optical signal amplifying sub-units.

23. The method of claim 22, wherein said optically connecting step further comprises the step of:

first determining which of said optical components on each of said optical signal amplifying, input and output sub-units utilize similar fibers and which of said optical components on each of said optical signal amplifying, input and output sub-units utilize different fibers for each of said first, second, third and fourth optical fiber amplifiers; and

providing optical interfaces between said desired sub-units selected to be optically connected such that each of said optical interfaces provides a low-loss and a high-strength optical fiber splice.

24. The method of claim 23, wherein said step of optically connecting comprises mounting on each of said pump sub-units a first-half member of a first and a second board mountable fiber-optic connector, each first-half member having a first type of an optical fiber and mounting on each of said optical signal amplifying sub-units two second-half members of said first and said second board mountable fiber-optic connector, each second-half member being adapted for mating with said first-half members.

25. The method of claim 24, wherein said step of optically connecting comprises mounting on each of said input sub-units a first-half member of a third board mountable fiber-optic connector having a second type of an optical fiber and mounting on each of said optical signal amplifying sub-units a second-half member adapted for mating with said first-half member on said input sub-units.

26. The method of claim 25, wherein said step of optically connecting comprises mounting on each of said output sub-units a first-half member of a fourth board mountable fiber-optic connector that contains an optical fiber of said second type and mounting on each of said optical signal amplifying sub-units a second-half member adapted for mating with said first-half member on said output sub-units.

27. The method of claim 26, wherein said first optical fiber amplifier is a line amplifier.

28. The method of claim 26, wherein said second optical fiber amplifier is an input amplifier having a first net gain.

29. The method of claim 26, wherein said third optical fiber amplifier is an output amplifier.

30. The method of claim 26, wherein said fourth optical fiber amplifier is an input amplifier having a second net gain.

31. The method of making an optical fiber amplifier, comprising the steps of:

arranging on a first pluggable sub-unit a first pump source having a first pump wavelength of λ_1, said first pluggable sub-unit having mounted on an edge a first-half member of a first board mountable fiber-optic connector adapted for mating with a corresponding second-half member mounted on a first edge of a second pluggable sub-unit;

arranging on said second pluggable sub-unit a first group of optical components that effect each of a first signal amplifying stage, a second signal amplifying stage, and the gain flatness of said optical fiber amplifier, said first group of optical components providing said optical fiber amplifier with a first net gain, said second pluggable sub-unit having mounted on said first edge said second-half member of said first board mountable fiber-optic

connector and said second sub-unit having mounted on a second edge a second-half member of each of a third and fourth board mountable fiber-optic connectors;

arranging on a third pluggable sub-unit a second group of optical components that effect an input stage of said optical fiber amplifier, said third pluggable sub-unit having mounted on an edge a first-half member of said third board mountable fiber-optic connector adapted for mating with said respective second-half member mounted on said second pluggable sub-unit;

arranging on a fourth pluggable sub-unit a third group of optical components that effect an output stage of said optical fiber amplifier, said fourth pluggable sub-unit having mounted on an edge a first-half member of said fourth board mountable fiber-optic connector adapted for mating with said respective second-half member mounted on said second pluggable sub-unit;

arranging on a fifth pluggable sub-unit a second pump source having a second pump wavelength of λ_2, said fifth pluggable sub-unit having mounted on an edge a first-half member of a fifth board mountable fiber-optic connector adapted for mating with a corresponding second-half member mounted on said first edge of said second pluggable sum-assembly; and

optically connecting each of said first, third, fourth and fifth pluggable sub-units into said second pluggable sub-unit via said respective first, third, fourth and fifth board mountable fiber-optic connectors to make said optical fiber amplifier.

32. The method of claim 31, further comprising the steps of:

substituting for said second pluggable sub-unit a sixth pluggable sub-unit which includes a fourth group of optical components that effect each of a first signal amplifying stage, a second signal amplifying stage, and the gain flatness of said optical fiber amplifier, said fourth group of optical components providing said optical fiber amplifier with a second net gain, said sixth pluggable sub-unit having mounted on a first edge a second-half member of each of a first and fifth board mountable fiber-optic connectors and said sixth pluggable sub-unit having mounted on a second edge a second-half member of each of a seventh and eighth board mountable fiber-optic connectors;

substituting for said third pluggable sub-unit a seventh pluggable sub-unit which includes a fifth group of optical components that effect an input stage of said optical fiber amplifier, said fifth group being a sub-set of said second group of optical components, said

seventh pluggable sub-unit having mounted on an edge a first-half member of said seventh board mountable fiber-optic connector; and

substituting for said fourth pluggable sub-unit an eighth pluggable sub-unit which includes a sixth group of optical components that are shared in an output stage of said optical fiber amplifier, said sixth group being a sub-set of said third group of optical components; said eighth pluggable sub-unit having mounted on an edge a first-half member of said eighth board mountable fiber-optic connector;

whereby said first, fifth, seventh and eighth pluggable sub-units are optically connected to said sixth pluggable sub-unit via said respective first, fifth, seventh and eighth board mountable fiber-optic connectors to make a different optical fiber amplifier.

33. The method of claim 32, wherein said optical fiber amplifier comprises:

one of said second and sixth pluggable sub-units that is optically connected to at least one of said first and fifth pluggable sub-units, one of said third and seventh pluggable sub-units and one of said fourth and eighth pluggable sub-units.

34. The method of claim 33, wherein each of said first, third, fourth, fifth, seventh and eighth board mountable fiber-optic connectors couple optical components constructed with similar optical fibers.

35. A method of making an optical fiber amplifier comprising the steps of:

testing the pump power and pump wavelength of a pump module to be connected to an information signal to be amplified;

if the desired pump power and pump wavelength are not present, rejecting said pump module for use in a larger assembly;

if the desired pump power and pump wavelength are present, accepting said pump module for use in a larger assembly;

assembling a signal input module having an input end to be connected to an information signal to be amplified and an output end that terminates in a plug connector;

connecting said signal input module to a source of a known signal representative of an information carrying signal;

measuring the signal present at said output end;

if the desired signal is not present at said output end, rejecting said input module for use in a larger assembly;

if the desired signal is present at said output end, accepting said input module for use in a larger assembly;

assembling a signal output module having an input end to be connected to an information signal to be amplified and an output end that terminates in a plug connector;

connecting said signal output module to a source of a known signal representative of an information carrying signal;

measuring the signal present at said output end;

if the desired signal is not present at said output end, rejecting said output module for use in a larger assembly;

if the desired signal is present at said output end, accepting said output module for use in a larger assembly;

assembling a signal amplifying module including at least an amplifying stage and having an input end and an output end, said input end of said signal amplifying module being connected to a coupler that has a pump input fiber and a signal input fiber and an output fiber;

providing a test information signal to said signal input fiber;

providing pump power to said amplifying stage through said power input fiber;

measuring the signal at the output end of said signal amplifying module;

if the desired signal is not present at said output end, rejecting said signal amplifying module for use in a larger assembly;

if the desired signal is present at said output end, accepting said signal amplifying module for use in a larger assembly;

mounting an accepted signal-amplifying module, an accepted input module, an accepted output module and an accepted pump module on a substrate;

optically connecting each of said input module, output module and pump module to said signal amplifying module; and

testing each of said modules on said substrate.

36. The method of claim 35, further comprising mounting a second accepted pump module having a pump wavelength of λ_2 on said substrate;

optically connecting said second accepted pump module to said accepted signal amplifying module; and

testing said second accepted pump module on said substrate.

37. A method of making n different types of optical amplifiers on one manufacturing line, n being equal to or greater than 2, said method comprising the steps of:

a) for each of the circuits which comprise each of the optical amplifiers to be made, providing a supply of at least four functional groups of sub-units, at least one functional group containing at least n different types of sub-units, each of the sub-units in 3 of said functional groups including a pluggable optical connector half and each of the sub-units of the fourth of said functional groups including 3 pluggable optical connector halves; and,

b) depending on the specification of the optical amplifier to be made, selecting a specific sub-unit from each of said functional groups and plugging together each of said selected sub-units to form an optical amplifier having the desired specification.